IN THE CLAIMS

Please amend the claims as indicated:

Claims 1-72 canceled.

73. (previously presented) An apparatus for drilling a borehole and determining a parameter of interest of a formation surrounding the borehole, said apparatus comprising:

(a) a longitudinal member for rotating a drill bit and adapted to be conveyed in the borehole;

(b) formation evaluation sensor on said longitudinal member for making measurements indicative of at least one of (A) a lithology of the formation, and, (B) a fluid content of the formation.

(c) an expert system for determining from said measurements of the formation evaluation sensor at least one of (C) the lithology of the formation, and, (D) the fluid content of the formation.

74. (new) An apparatus for determining a parameter of interest of a formation surrounding a borehole, said apparatus comprising:

(a) a nuclear magnetic resonance (NMR) sensor producing a pulsed RF field for obtaining first measurements indicative of the parameter of interest of the formation, the RF field characterized by a plurality of parameters; and

(c) a processor including an expert system for controlling at least one

parameter of the pulsed RF field.

75. (new) The apparatus of claim 74 wherein the processor is at a downhole location.

76. (new) The apparatus of claim 74 wherein the pulsed RF field comprises a pulse sequence of the form:

$$\left[TW_i - 90_{\pm\pi/2} - (\tau - X - \tau - echo)_j\right]_i^3$$

wherein TW is a wait time, $90_{\pm\pi/2}$ refers to a phase alternated 90^0 tipping pulse , X is a refocusing pulse with a tipping angle that lies between 90^0 and 180^0, j is the number of echos observed, i is a number of repetitions, and 2τ is an interecho spacing, and wherein the parameter of interest of the pulsed RF field is selected from the group consisting of: (i) the tipping angle of the refocusing pulse, (ii) the number of echos j, (iii) the number of repetitions i, (iv) the interecho spacing, and (v) the wait time.

77. (new) The apparatus of claim 74 further comprising a telemetry module for communicating signals to and from a surface location

78. (new) The apparatus of claim 76 wherein the processor applies a stimulated echo correction to the first measurements, the stimulated echo correction determined by

at least one of (i) a temperature of the formation, (ii) an intensity of the RF field, (iii) a bandwidth of the tipping pulse, and, (iv) a bandwidth of the refocusing pulse.

79. (new) The apparatus of claim 74 further comprising a formation evaluation sensor for making second measurements indicative of at least one of (i) a lithology of the formation, and, (ii) a fluid content of the formation.

80. (new) The apparatus of claim 79 wherein the expert system determines from the second measurements at least one of (i) the lithology of the formation, (ii) the fluid content of the formation, and (iii) petrophysical properties.

81. (new) The apparatus of claim 74 further comprising a formation pressure tester (FPT) wherein the processor determines a fluid viscosity from measurements made by the FPT and NMR sensor.

82. (new) The apparatus of claim 74 wherein the parameter of interest comprises at least one of (i) clay bound water, (ii) gas saturation, (iii) porosity, (iv) bound volume irreducible, (v) bound water movable, (vi) shale content, and (vii) presence of hydrocarbons.

83. (new) The apparatus of claim 74 further comprising an additional sensor selected

from the group consisting of (i) a gamma ray sensor, (ii) a neutron sensor, (iii) a resistivity sensor, and, (iv) an acoustic sensor.

84. (new) The apparatus of claim 74 wherein the processor provides a quality control (QC) diagnostic based on at least one of (i) a signal from a motion sensor, (iii) a sum of echos (SE) produced by the NMR sensor.

85. (new) The apparatus of claim 74 wherein the first measurements further comprise two channels of data, the processor further determining a corrected measurement based on said two channels.

86. (new) The apparatus of claim 74 wherein the processor applies a calibration to the first measurements, said calibration based upon measurements made with the NMR sensor in a medium of known porosity.

87. (new) The apparatus of claim 74 wherein the expert system comprises a neural net that has been trained and validated.

88. (new) A method of determining a parameter of interest of an earth formation comprising:

(a) conveying a logging assembly into a borehole in the earth formation;

(b) using a nuclear magnetic resonance (NMR) sensor on the logging

assembly and producing a pulsed RF field for obtaining first measurements indicative of the parameter of interest of the formation, the RF field characterized by a plurality of parameters; and

(c) using a processor including an expert system for determining a lithology of the formation and selecting at least one parameter of the pulsed RF field based at least in part on the determined lithology.

89. (new)The method of claim 88 wherein the processor is at a downhole location.

90. (new) The method of claim 88 the pulsed RF field a pulse sequence of the form:

$$\left[TW_i - 90_{\pm\pi/2} - (\tau - X - \tau - echo)_j\right]_i^2$$

wherein TW is a wait time, $90_{\pm\pi/2}$ refers to a phase alternated 90^0 tipping pulse , X is a refocusing pulse with a tipping angle that lies between 90^0 and 180^0, j is the number of echos observed, i is a number of repetitions, and 2τ is an interecho spacing, and wherein the parameter of interest of the pulsed RF field is selected from the group consisting of: (i) the tipping angle of the refocusing pulse, (ii) the number of echos j, (iii) the number of repetitions i, (iv) the interecho spacing, and (v) the wait time.

91. (new) The method of claim 88 further comprising using a telemetry module on the

BHA for communicating signals to and from a surface location.

92. (new) The method of claim 90 further comprising using the processor for applying a stimulated echo correction to the first measurements, the stimulated echo correction determined by at least one of (i) a temperature of the formation, (ii) an intensity of the RF field, (iii) a bandwidth of the tipping pulse, and, (iv) a bandwidth of the refocusing pulse.

93. (new) The method of claim 88 further comprising using a formation evaluation sensor for making second measurements indicative of at least one of (i) a lithology of the formation, and, (ii) a fluid content of the formation.

94. (new) The method of claim 93 further comprising using the expert system for determining from the second measurements at least one of (i) the lithology of the formation, (ii) the fluid content of the formation, and (iii) petrophysical properties of the formation

95. (new) The method of claim 88 further comprising:

(i) using a formation pressure tester (FPT) for providing a measurement indicative of a mobility of a fluid in said formation, and

(ii) using said downhole processor for determining a fluid viscosity from measurements made by the FPT and NMR sensor.

96. (new) The method of claim 88 wherein the parameter of interest comprises at least one of (i) clay bound water, (ii) gas saturation, (iii) porosity, (iv) bound volume irreducible, (v) bound water movable, (vi) shale content, and (vii) presence of hydrocarbons.

97. (new) The method of claim 88 further comprising using an additional sensor selected from the group consisting of (i) a gamma ray sensor, (ii) a neutron sensor, (iii) a resistivity sensor, and, (iv) an acoustic sensor, for making a measurement indicative of a parameter of interest of said formation.

98. (new) The method of claim 88 further comprising using the processor for providing a quality control (QC) diagnostic based on at least one of (i) a signal from a motion sensor, (iii) a sum of echos (SE) produced by the NMR sensor assembly.

99. (new)The method of claim 98 further comprising using the processor based on said QC diagnostic for at least one of (i) discarding a subset of the first measurements, (ii) replacing a subset of the first measurements with another subset of the first measurements, (iii) zeroing out partial echo trains.